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RESEARCH COLLABORATION AND USE OF ARTIFICIAL INTELLIGENCE TOOLS FOR RESEARCH OUTPUT AMONG POLYTECHNIC LECTURERS IN KWARA STATE, NIGERIA

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ABSTRACT

This study investigated research collaboration and the use of artificial intelligence (AI) tools for research output among Polytechnic lecturers in Kwara State, Nigeria. The objectives were to assess the level of

research collaboration, extent of AI tools usage, and the challenges affecting research output. A descriptive survey research design was adopted, and data were collected from 361 lecturers from Kwara State Polytechnic, Ilorin, and Federal Polytechnic, Offa. A structured questionnaire served as the instrument for data collection, while data were analyzed using descriptive statistics. Findings revealed a moderate level of research collaboration, mainly within institutions and through digital platforms such as ResearchGate and Google Scholar, while international collaboration and joint grant applications were low. Lecturers demonstrated a high extent of AI tools usage, particularly in plagiarism detection and writing assistance. The level of research outputs was moderate, with greater engagement in conference and seminar presentations than in indexed journal publications or funded research. Major challenges identified included heavy teaching workload, limited funding, and inadequate digital infrastructure. The study concluded that research outputs among Polytechnic lecturers are moderate and recommended institutional support, digital infrastructure improvement, and AI literacy training by polytechnic management for research output.

Keywords: Research collaboration, Artificial intelligence tools, Research output, Polytechnic lecturers, Kwara State

Introduction

Research output has become a central indicator of academic excellence and institutional prestige in higher education. Research output can also refer to as research productivity is the measurable products of research activities undertaken by scholars or researchers often used to evaluate academic productivity and contribution to knowledge. Polytechnics and other tertiary institutions rely heavily on research outputs such as peer-reviewed journal articles, conference proceedings, patents, and grants to advance knowledge, attract funding, and contribute to national development. Akai and Uford (2025) stated that lecturers are well aware that their academic visibility and personal growth on the job has been 'hinged' to their research output. Also, Tom and Ndaeyo (2024) stated that lecturers' job responsibilities clearly identify and include them embarking on research studies regularly as research reports are highly valued in the academia. In the global knowledge economy, academics are expected not only to teach but also to produce high-quality research that addresses societal challenges, enhances innovation, and strengthens national competitiveness (World Bank, 2022). Research output encompasses publications, presentations, patents, reports and other tangible outcomes of scholarly inquiry.

Research output has become a key requirement for academic promotion, tenure, and institutional ranking, thereby compelling academics to engage in scholarly activities that contribute to the growth of knowledge and address societal challenges. Akinbowale, Adesina, Saliu, Oyeniran, and Hammed (2025) stated that research productivity is a means by which researchers contribute new knowledge to the existing body of knowledge. Further stated that, this implies that researchers add and build on the previous knowledge of other researchers. Madukoma, Olanusi and Babalola (2023) also stated that academic advancement, appointments, and growth, as well as the ranking and rating of institutions of higher learning,

have become increasingly dependent on research output. Similarly, Kwanya (2020) stated that research productivity gives academics recognition nationally and internationally and in the academic circles, the major yardstick for measuring success is research publications/outputs which are critical determinants of staff tenure and promotion. Research output determines the professional growth of academics, enhances institutional reputation and contribute to national and global development. Mushtaq and Shahzan (2025) stated that research productivity is widely recognised as a cornerstone of academic excellence, institutional ranking, and national development.

One of the strongest drivers of research output is collaboration; enables the pooling of expertise, resources, and perspectives, thereby improving the quality, visibility, and impact of research outputs. Iwu-James and Yakob (2023) stated that collaboration provides a foundation of shared experiences and understanding that can lead to productive and meaningful contributions to the research endeavor. Also, Igben and Adebayo (2023) stated that collaborative research has recently gained popularity among academics and it entails sharing knowledge and ideas and working as a team to achieve a common goal. In lieu of this collaboration helps academics in resource-constrained environments, such as many Nigerian polytechnics, to overcome infrastructural and funding limitations by accessing external networks and partnerships. Empirical studies have shown that collaborative works, particularly international collaborations, tend to yield higher citation impact and broader dissemination compared to single-authored works (Vieira, Alves & Gomes, 2024). Similarly, Weller, Hurd and Wiberley (2014) submitted that collaboration across borders have become more important now than ever, they also reported that international collaboration is positively related to a researcher's future research productivity.

In recent years, AI tools have emerged as powerful enablers of research. Nwafor and Umetiti (2025) stated that ranging from education to research, AI has become a transforming power, changing many industries. AI applications are now widely used in literature searching, data mining, statistical analysis, plagiarism detection, academic writing assistance, and even peer review processes. Müller, Winkler and Weitzel (2022) stated that AI algorithms can scan vast amounts of literature, summarising key findings and identifying research gaps. AI-powered research assistants, such as automated literature review systems and intelligent search engines, have become indispensable tools for researchers, helping them to stay abreast of the latest developments in their fields (Nwafor & Umetiti, 2025). AI applications such as ChatGPT, Gemini, Elicit, Scholarcy, DeepSeek, Grammarly, Turnitin, and AI-powered data analysis software are now widely used to enhance the research process. AI Grammarly can proofread and correct errors in research writing (Thomas, Gambari, Sobowale & Shehu, 2024). Tait, Martzoukou and Reid (2016) found out that authors found that AI tools like predictive indexing, smart search engines, and automated research recommendation systems significantly enhance librarians' ability to support researchers. AI integration has the potential to significantly enhance research outputs by reducing time spent on routine tasks and enabling deeper intellectual engagement in research process. However, ethical concerns such as plagiarism, bias, transparency, and over-reliance remain pressing issues (Madanchian, 2025).

In Nigeria, and specifically in Kwara State, polytechnic lecturers are under pressure to increase their research outputs in response to promotion criteria set by the regulatory body, the National Board for Technical Education (NBTE), and institutional requirements for tenure and advancement. While research collaboration is increasingly encouraged through memoranda of understanding, partnerships, and professional networks, the extent to which it influences research outputs of polytechnic lecturers in Kwara State has not been adequately investigated. Similarly, although AI tools are rapidly gaining attention, little empirical evidence exists on their use and contribution to research output among polytechnic lecturers. This gap in the literature underscores the need to investigate the joint role of research collaboration and AI tools use for research output of polytechnic lecturers in Kwara State. Findings from this study will not only contribute to scholarly discourse on research output in developing contexts but also provide evidence-based recommendations for policy, institutional support, and capacity building in Nigerian higher education.

Research Questions

The study sets out to provide answers to the following research questions:

1. What is the level of research collaboration among polytechnic lecturers in Kwara State?
2. What is the extent of using AI tools in research activities among polytechnic lecturers in Kwara State? and
3. What are the challenges faced in using AI tools for research activities and collaborations among polytechnic lecturers in Kwara State?

Review of Related Literature

Research output refers to the measurable products of research activities undertaken by scholars, researchers or institutions often used to evaluate academic productivity and contribution to knowledge. World Bank (2022) describes research output as the collective scholarly products of academic and research institutions including journal articles, books, conference proceedings and other knowledge contributions that signify institutional capacity and impact. Similarly, Auranen and Nieminen (2010) stated that research output includes publications in peer-reviewed journals, conference proceedings, patents, monographs, book chapters, and research grants obtained. Akinbowale *et al.* (2025) stated that research productivity often serves as a major role in attaining success in academic circle as it is related to promotion, tenure, salary of an academic staff. In higher education, research output serves as a benchmark for institutional ranking, academic promotion, and national development (World Bank, 2022).

Research output is a critical determinant of the professional advancement of academics, the enhancement of institutional reputation, and the promotion of development at both national and global levels. The National Universities Commission (NUC) emphasizes research productivity as a key requirement for career progression, making it an essential performance indicator among academics (Okiki, 2013). Therefore, research output is particularly important within the academia (Akai & Uford, 2025). The extent and quality of research output significantly influence the career progression of academics, the visibility and prestige of

institutions, and the advancement of socio-economic development. Akai (2023) stressed that quality research output is of utmost importance within the university environment as it is a major criterion used for ranking world class universities.

Tweheyo, Abaho and Verma (2022) stated that universities, regardless of their geographical setting, are widely recognised as epicentre for the creation and dissemination of knowledge, with most research outputs originating from them. Similarly, Popoola (2019) stated that quality of research productivity by academics in any university system depends largely on the quality and quantity of information resources at their disposal. Albert, Davia and Legazpe (2016) stated that research and publication are argued to be the most conspicuous determinants of academic status in universities and other higher learning institutes in many countries, including Nigeria. However, academics regard research activities as a crucial part of their roles, leading to new knowledge and scientific discoveries (Kpolovie & Dorgu, 2019).

There are challenges hindering research outputs among academics range from individual constraints, such as workload and skill deficits, to systemic issues like inadequate funding, poor infrastructure, limited global visibility, and under-utilisation of technology. According to Olatokunbo and Olayinka (2021), scholars in Nigeria often face systemic challenges, including inadequate funding, insufficient infrastructure, and limited access to international journals, which affect their research productivity. Igbokwe, Benson and Enem (2019) findings indicate that inability to adopt appropriate research methods leads to poor quality of research while possessing the right research skills leads to producing quality research. Consequently, exploring determinants such as collaboration and AI tools becomes necessary for boosting academic research output as research output is still an issue.

In a study by Haruna, Momoh and Ismail (2023) on the research and publication productivity of the academic staff at Auchi Polytechnic, they found out that the publication productivity among the staff was low. Similarly, Abiodun-Oyebanji (2023) examined lecturer research output in Colleges of Education (CoE) in Southwest, Nigeria, the study found out that lecturers' research productivity was low. However, Bamigboye, Adenekan, and Olude (2018) assessed the research output of 536 academic staff at the Federal University of Agriculture in Abeokuta, Nigeria, and found that the level of research output among the staff was high.

Furthermore, exploring collaboration and AI tools becomes necessary for boosting academic research output. Collaboration is the process in which two or more individuals; groups or institutions engage in joint efforts to achieve a common goal. According to Kemp (2013), collaboration is the act of working collectively with other individuals for an agreed-upon mission. Recipe, Adekunmisi and Akinbode (2017) stated that collaboration offers several opportunities in education. First, they can be used as a means of preparing the current generation of students for the future workplace. In lieu of this, research collaboration is a critical driver of academic productivity, knowledge transfer, and innovation. Research collaboration can be referred to as the systematic partnership between academics aimed at merging expertise, resources and ideas to enhance research output and visibility. According to Onyancha (2020), research collaboration is a strategic academic partnership that allows individuals, institutions or countries to synergise efforts in

producing research outputs of higher quality, visibility and impact. Iwu-James and Yakob (2023) stated that research collaboration can help academic librarians to improve their research outcomes. Lund ***et al.*** (2021) posit that research collaboration offers opportunities for publishing in high-impact journals, thus increasing scholar's visibility and productivity.

Research collaboration is increasingly emphasised as a pathway to enhance research output and global competitiveness. Hussaini and Attahiru (2025) stated that institutions should enhance the implementation and visibility of supportive policies by providing equitable access to research resources and facilitates collaborative opportunities. Iwu-James and Yakob (2023) stated that successful research collaboration has the potential to promote creativity, knowledge flow, facilitate cross-fertilisation which will lead to higher productivity. Agboola (2019) concluded that academic deliberately collaborate to be productive in their various fields and to improve their publication output.

Breeze and Taylor (2020) reported that through collaboration, individual researchers can expand their research outputs, and that when academic collaborate in effective teams, they leverage the knowledge, skills, abilities and experiences of team members to accomplish things that could not be achieved while working individually and this leads to higher performance and productivity. However, research collaboration requires ability to use e-communication platforms (Jacob & Meeks, 2013). AI has shown promise in fostering productive collaboration and deeper understanding among researchers. For instance, Elsevier has released an alpha edition of Scopus AI to facilitate cooperation and the social significance of research. This app blends generative AI with reliable Scopus data and content (Elsevier, 2023).

The emergence of AI has transformed the research process. Chen ***et al.*** (2020) stated that the incorporation of AI into academic studies is a worldwide trend changing how research is done, examined, and shared. Nwafor and Umetiti (2025) stated that academics now see AI in scholarly research as a changing factor, driven by technology developments improving involvement and simplifying research procedures. AI refers to computer systems capable of performing tasks that typically require human intelligence. According to Isiaka, Olarongbe, Mahammuod, Aremu and Saba-Jibril (2024), AI is a branch of computer science and engineering that focuses on developing intelligent machines that can perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation.

In research, AI can be referred to as systematic use of intelligent digital tools and algorithms to enhance research processes such as data collection, analysis, interpretation and dissemination. AI tools are used for literature search *"Elicit"*, writing assistance *"ChatGPT",* citation management *"Mendeley"* with AI support. These tools reduce the workload of academics, enhance efficiency, and improve the quality of research outputs (Chen ***et al.,*** 2021). AI tools are now widely employed for literature review, data analysis, plagiarism detection, manuscript drafting, and citation management. According to Khalifa (2023), AI applications such as ChatGPT, Elicit, and Scholarcy significantly reduce the time spent on routine research tasks, thereby enabling academics to focus on higher-level analytical work. Von-Krogh ***et al.*** (2023) also stated that AI has proven to be a useful tool for statistical analysis and evaluation of literature, including

systematic literature reviews.

Furthermore, AI-driven tools enhance accuracy in data handling and provide personalised writing support (Chen *et al.,* 2021). Burger, Singh and Adeniran (2023) stated that AI tools such as machine language (ML) algorithms can analyse complex datasets, identifying trends, correlations, and anomalies. Similarly, Nguyen-Trung *et al.* (2023) stated that ML can conduct intricate analyses of textual data, helping researchers to categorise and interpret qualitative data effectively. Alonta, Onwubuya and Onwuamaeme (2024) underlined the benefits of AI on learning results and data security in higher education as well as issues like plagiarism and academic integrity. They further stated that although AI offers possibilities for tailored education and enhanced research methods, it also requires a strong framework to maintain academic standards.

AI adoption improves research efficiency, but cautioned that ethical concerns such as plagiarism, bias, transparency, and intellectual property must be addressed (Madanchian, 2025). However, while scholars in developed countries are rapidly adopting AI in research workflows, African academics face challenges such as poor digital literacy, infrastructural deficits, and lack of institutional policies on responsible AI usage (Akinwale & Adebowale, 2023). Also, Yakubu (2025) revealed that academics generally understand the value of AI in research, and that helps them with literature reviews, improves research accuracy, and reduces time spent on data analysis but low level of AI literacy can slow down their research productivity.

The intersection of collaboration and AI adoption presents a new frontier for academic productivity. Efebeh, Orishede and Igoh (2024) stated that academics have been able to use artificial intelligence as a powerful tool for their writing, research, and collaboration. Further stated AI facilitates research and writing more quickly, enhances collaboration, and offers new insights to the academic community. Collaboration thrives when supported by digital platforms and AI-enabled communication tools, which reduce barriers of distance and time (Zhang & Heckman, 2020). Furthermore, Garbuio and Lin (2021) stated that AI-powered tools enable academics to work together on research endeavours in real-time, making sharing ideas, tracking progress, and providing feedback simpler. AI can enhance collaboration by streamlining knowledge sharing, automating repetitive tasks, and improving team efficiency in joint projects.

Nwafor and Umetiti (2025) stated that AI is enhancing collaboration among researchers by providing platforms that support shared research efforts across different geographical locations. Vieira *et al.* (2024) found out that AI-supported collaborations tend to produce outputs with broader visibility, especially in multi-institutional research. In Nigeria, the adoption of AI tools in research processes is still in its early stages, and there is little empirical evidence on how their usage interacts with collaboration to influence research output (Bako & Mohammed, 2022). Therefore, this study tends to shed light on the combined effects of collaboration and AI use for boosting scholarly productivity and meeting institutional performance expectations.

Methodology

The study adopted a descriptive survey research design to collect opinions on the identified variables without manipulating them. A purposive sampling technique was employed to select two polytechnics from Kwara State that possess specific characteristics relevant to the research objectives. This

method allowed the researcher to intentionally choose polytechnics that provide rich, reliable and contextually meaning data. Questionnaire was employed as data collection instrument and the validity was ensured through expert review to confirm content relevance and clarity. Data were collected using a well-structured questionnaire designed with Google Form. The instrument link was shared electronically to the respondents via emails and WhatsApp groups. Respondents were informed about the purpose of the study and assured of the confidentiality of their responses. The researcher followed up with reminders to ensure a satisfactory response rate. Data collected were analysed using descriptive statistics such as frequency, percentage, mean scores and standard deviation with the aid of SPSS software. The results were presented in tables for easy interpretation and understanding. The study upheld ethical standards by ensuring voluntary participation, informed consent, and confidentiality of respondents' information. Data collected were strictly used for academic purposes.

Data Analysis and Results

Table 1: Response Rate of the Study

Institutions	Frequency	Percentage (%)
Kwara State Polytechnic, Ilorin	241	33.3
Federal Polytechnic, Offa	120	66.7
Total	**361**	**100**

Out of the total 361 respondents who participated in the study, 241 (66.7%) were from Kwara State Polytechnic, Ilorin, while the remaining 120 (33.3%) were from Federal Polytechnic, Offa. This suggests a relatively higher level of engagement from Kwara State Polytechnic, possibly higher interest in the study. The online questionnaire link was left active for a period of 30 days to allow adequate participation and higher response retrieval. This distribution reflects the relative size and accessibility of academic staff across the two institutions involved in the study.

Table 2: Level of Research Collaboration among the Respondents

Level of Collaboration	SA	A	D	SD	Mean	Std. Dev. (σ)
I frequently collaborate with colleagues within my Polytechnic on research projects.	156(43.2%)	134(37.1%)	45(12.5%)	26(7.2%)	3.16	0.87
I frequently collaborate with academics from other Polytechnics within Kwara State.	128(35.5%)	146(40.4%)	54(15.0%)	33(9.1%)	3.02	0.91
I collaborate with academics from other Nigerian Polytechnics.	141(39.1%)	129(35.7%)	57(15.8%)	34(9.4%)	3.04	0.89
I collaborate with international scholars on research activities.	119(33.0%)	111(30.7%)	76(21.1%)	55(15.2%)	2.81	0.99
I have co-authored research papers with other academics in the last five years.	152(42.1%)	124(34.3%)	53(14.7%)	32(8.9%)	3.10	0.88

I regularly engage in collaborative grant applications or funded projects.	127(35.2%)	118(32.7%)	72(19.9%)	44(12.2%)	2.91	0.95
I use digital platforms (e.g., Google Scholars, Microsoft Teams, Research Gate) to collaborate with colleagues.	166(46.0%)	127(35.2%)	43(11.9%)	25(6.9%)	3.21	0.83

Grand Mean = 3.04

Decision Rule: *If Mean Range is 1.00 – 1.49 (Strongly Disagree); 1.50 – 2.49 (Disagree); 2.50 – 3.49 (Agree) and 3.50 – 4.00 (Strongly Agree).*

Table 2 reveals that the respondents, generally agree that they engage in research collaboration at varying levels (Grand Mean = 3.04, SD = 0.90). The highest collaboration frequency occurs within their own institutions and through digital platforms (Mean = 3.16 and 3.21, respectively). However, collaboration with international scholars (Mean = 2.81) and collaborative grant applications (Mean = 2.91) were relatively lower. These results suggest that while local collaboration is fairly strong, cross-institutional and international research partnerships remain underdeveloped.

Table 3: Extent of AI Tools Use in Research Activities among the Respondents

Extent of Use	SA	A	D	SD	Mean	Std. Dev. (σ)
I use AI-powered tools (e.g., ChatGPT, Elicit, DeepSeek, Scholarcy, Gemini) to summarize or review literature.	177(49.0%)	116(32.1%)	43(11.9%)	25(6.9%)	3.23	0.84
I use AI software (e.g., IBM SPSS Modeler, ANEVA, PolyAnalyst, FactSet) for data analysis and interpretation.	168(46.5%)	121(33.5%)	44(12.2%)	28(7.8%)	3.19	0.86
I use AI tools (e.g., Grammarly, QuillBot, Wordtune, Slick Write) for writing support (grammar checks, paraphrasing, text generation).	184(51.0%)	117(32.4%)	38(10.5%)	22(6.1%)	3.28	0.80
I use plagiarism detection tools (e.g., Turnitin, iThenticate, PlagTracker, Copyscape) in my research work.	192(53.2%)	106(29.4%)	41(11.4%)	22(6.0%)	3.30	0.81
I use AI tools (e.g., Sourcetable, Smart Graph Maker, Chart Generator, Piktochart) to generate figures, tables, or visualisations for my research.	119(33.0%)	111(30.7%)	76(21.1%)	55(15.2%)	2.81	0.99
I rely on AI tools (e.g., PowerGPT, STORM, PyZoBot) to improve research process.	127(35.2%)	118(32.7%)	72(19.9%)	44(12.2%)	2.91	0.95

Grand Mean = 3.12

Decision Rule: *If Mean Range is 1.00 – 1.49 (Strongly Disagree); 1.50 – 2.49 (Disagree); 2.50 – 3.49 (Agree) and 3.50 – 4.00 (Strongly Agree).*

Table 3 shows that the respondents, have a high extent of AI tools usage in research (Grand Mean = 3.20, SD = 0.85). The highest mean scores were recorded for using plagiarism detection tools (Mean = 3.30) and AI-based writing assistants (Mean = 3.28). Comparatively, fewer lecturers use AI tools to improve research process (Mean = 2.91) or AI-driven visualisation tools (Mean = 2.81). This implies that while AI tools are well integrated into literature review, writing, and plagiarism checking, their adoption to improve research process and visualisation purposes is still emerging among the respondents.

Table 4: Challenges faced in AI Tools Use for Research Activities and Collaborations among the Respondents

Challenges	**SA**	**A**	**D**	**SD**	**Mean**	**Std. Dev. (σ)**
Lack of training/literacy limits my ability to use AI tools effectively.	164(45.4%)	132(36.6%)	41(11.4%)	24(6.6%)	3.21	0.83
Ethical concerns (e.g., plagiarism, bias, misinformation) discourage me from using AI tools.	142(39.3%)	138(38.2%)	54(15.0%)	27(7.5%)	3.09	0.87
Limited access to stable internet or digital infrastructure hinders my use of AI tools.	171(47.4%)	124(34.3%)	39(10.8%)	27(7.5%)	3.22	0.85
Funding constraints limit my ability to engage in collaborative research.	186(51.5%)	119(33.0%)	34(9.4%)	22(6.1%)	3.30	0.82
Institutional policies and support for collaboration are inadequate.	158(43.8%)	134(37.1%)	43(11.9%)	26(7.2%)	3.18	0.84
Heavy teaching workload reduces my time for research collaboration.	193(53.5%)	116(32.1%)	32(8.9%)	20(5.5%)	3.34	0.79
Grand Mean = 3.22						

Decision Rule: *If Mean Range is 1.00 – 1.49 (Strongly Disagree); 1.50 – 2.49 (Disagree); 2.50 – 3.49 (Agree) and 3.50 – 4.00 (Strongly Agree).*

Table 5 reveals that the major challenges affecting the use of AI tools and engaging in research collaboration among the respondents, include: Heavy teaching workload (Mean = 3.34), Funding constraints

(Mean = 3.30), and Limited internet/digital access (Mean = 3.22). These findings suggest that although lecturers recognise the potential of AI tools in enhancing research productivity. However, structural, institutional, and capacity-related barriers continue to impede full utilisation. The grand mean (3.22) indicates that respondents agree that these challenges significantly affect their ability to integrate AI tools and engage in collaborative research effectively.

Discussion of the Findings

The findings of this study revealed that Polytechnic lecturers in Kwara State generally engage in research collaboration at varying levels, with the highest collaboration frequency occurring within their own institutions and through digital platforms such as Google Scholars, Microsoft Teams and Research Gate. This is in line with the findings of Okonedo *et al.* (2021), that intra-institutional collaboration remains the most common form of research partnership among academics in Nigerian tertiary institutions due to ease of communication, shared goals, and resource accessibility. Similarly, Onyancha (2021) stated that intra-institutional and national collaborations dominate academic publishing trends in sub-Saharan Africa because of limited funding and logistical barriers to international partnerships. Furthermore, Alemu and Tadesse (2022) observed that institutional proximity and shared academic interests significantly enhance the likelihood of collaboration among faculty members. In the same vein, Allahmagani and Babalola (2025) findings revealed that librarians' research collaboration was to a high extent. This implies that the polytechnic lecturers in Kwara State are leveraging both traditional institutional collaborations and modern digital tools to improve their research engagement and output.

However, collaboration with international scholars and participation in collaborative grant applications were found to be relatively low among the lecturers. These findings corroborate the study of Aina and Ajibola (2021), that while local collaboration among lecturers is fairly common, international research partnerships remain minimal due to insufficient institutional support, high cost of communication, and lack of access to global research networks. Ocholla and Onyancha (2022) found that African academics often face structural barriers such as weak research infrastructure, low digital visibility, and limited grant-writing expertise, which hinder their ability to compete effectively for international funding opportunities. Similarly, Ogbomo and Ogbomo (2020) reported that limited international exposure, inadequate funding, and bureaucratic bottlenecks significantly constrain Nigerian academics from engaging in cross-border research collaborations. This implies that despite growing awareness of the benefits of global collaboration, most of the polytechnic lecturers are still operating within local or regional networks, thereby limiting their exposure and opportunities to international best practices and potential for research funding.

Furthermore, the findings of this study showed that the lecturers demonstrated a high extent of AI tools usage in research, with the most frequently utilised applications being plagiarism detection tools (such as Turnitin and iThenticate) and AI-based writing assistants (such as Grammarly and QuillBot). This finding is supported by the study of Nwafor and Umetiti (2025), that AI-powered research assistants, such as automated literature review systems and intelligent search engines, have become indispensable tools for researchers, helping them to stay abreast of the latest developments in their fields. Similarly, Eke and Nwosu (2023) reported that plagiarism detection and writing-enhancement tools are among the most commonly adopted AI applications in Nigerian higher institutions due to their accessibility and direct relevance to academic writing. Also, Thomas *et al.* (2024) stated AI Grammarly can proofread and correct errors in research writing. In the same vein, Okafor and Olatunji (2022) found that the integration of AI-powered writing assistants significantly improves the clarity, coherence, and linguistic accuracy of research

manuscripts among academic staff, thereby enhancing overall publication quality. Müller *et al.* (2022) also stated that AI algorithms can scan vast amounts of literature, summarising key findings and identifying research gaps. This suggests that the lecturers are gradually embracing AI-driven innovations as a means of enhancing efficiency, accuracy, and productivity in their research processes.

Comparatively, fewer lecturers were found to use AI tools for enhancing the research process (such as AI-powered data analysis or predictive modeling) or for AI-driven data visualisation and presentation. This finding is in line with the study of Ngugi and Mutua (2022), that the use of AI in research visualisation and data interpretation is still emerging in African higher education institutions, primarily due to limited technical expertise, inadequate training, and low institutional investment in digital infrastructure. Similarly, Adigun and Bello (2023), who observed that while most academics in Nigerian polytechnics are aware of AI technologies, their utilisation remains largely confined to basic applications like plagiarism checks and writing support, with limited adoption of advanced analytical or visualisation tools. Furthermore, Mensah and Boateng (2023) found that although awareness of AI-driven research tools is increasing, skill gaps, cost barriers, and lack of institutional support hinder their broader integration into the research process. Akinwale and Adebowale (2023) also stated that while scholars in developed countries are rapidly adopting AI in research workflows, African academics face challenges such as poor digital literacy, infrastructural deficits, and lack of institutional policies on responsible AI usage. This suggests that while polytechnic lecturers in Kwara State are embracing certain aspects of AI technology, the adoption and usage of more sophisticated AI-based research applications remain at a developmental stage, requiring targeted capacity building and institutional support for sustainable integration.

This study further revealed the major challenges affecting the use of AI tools and engagement in research collaboration among the lecturers. The most prominent challenges identified include heavy teaching workload, funding constraints, and limited internet or digital infrastructure. This finding is in corroboration with the study of Ogunmodede *et al.* (2023) emphasised that unstable Internet connectivity and insufficient access to digital research facilities are major obstacles to the adoption of AI-powered platforms and online collaboration tools in Nigerian polytechnics. Similarly, Ahmad (2020) identified low internet bandwidth and financial constraints as an impediment to lecturers' research productivity in federal universities in Nigeria. Furthermore, Eke and Nwosu (2023) noted that excessive teaching responsibilities and administrative duties often reduce the time available for academic staff to participate in meaningful research and collaborative activities. Nguyen *et al.,* (2021) suggested that these issues can be dealt with through formal research training and on-the-job practice, developing synergies between research and teaching/consulting and finding partners to assist in fieldwork and analysis. The findings also corroborate Alemu and Tadesse (2022), who observed that the absence of strong institutional support structures, coupled with limited ICT infrastructure, continues to undermine the digital transformation of research in many African higher education institutions.

In addition, the study revealed that structural, institutional, and capacity-related barriers continue to impede the full utilisation of AI tools and the effective engagement in research collaboration among the lecturers. The grand mean score of 3.22 indicated that respondents agreed that these challenges

significantly affect their ability to integrate AI tools and participate meaningfully in collaborative research activities. This finding is consistent with the observation of Oni and Eze (2023), they reported that infrastructural limitations, inadequate digital skills, and weak institutional frameworks are major constraints to the adoption of emerging research technologies in Nigerian tertiary institutions. Shahzad *et al*. (2023) stated that while several structural challenges such as poor funding, limited access to digital infrastructure, and insufficient research training have been acknowledged, an equally critical but underexplored factor is the role of institutional management policy. Similarly, Okafor and Adetunji (2022) emphasised that institutional policies often fail to provide the necessary support for sustainable research collaboration. Aina and Ajibola (2021) also noted that lack of technical training and mentorship opportunities hampers lecturers' competence in using advanced AI-based research applications. These findings suggest that despite the growing recognition of AI and collaboration as essential components of modern research productivity, structural and institutional barriers still constrain Polytechnic lecturers from fully exploiting the potential of digital and collaborative research practices. Addressing these issues through policy reforms, digital infrastructure investment, and workload management could substantially enhance research performance and technological adoption to enhance research innovation and outputs among the lecturers.

Conclusion

This study has revealed that both research collaboration and AI tools usage play significant roles in enhancing the research output polytechnic lecturers in the State and therefore, concluded that the lecturers demonstrated a moderate level of research collaboration, with most partnerships occurring within their institutions and through local networks. However, collaborations involving international scholars and competitive grant applications remain relatively low, limiting broader exposure and access to global research funding opportunities. The study further concluded that research outputs among the lecturers are moderate, with a greater emphasis on conference and seminar papers rather than publications in indexed journals or funded research projects, underscoring the need for stronger institutional support, mentorship, and incentives for scholarly publishing and research grant pursuits. Moreover, it was established that heavy teaching workload, poor funding, limited internet access, and inadequate institutional support are major obstacles that hinder effective research collaboration and AI tool utilisation. Finally, this study affirms that the strategic promotion of research collaboration and the integration of AI tools can substantially improve the research output and global competitiveness of the polytechnic lecturers.

Recommendations

1. Based on the findings and conclusions of this study, the following recommendations are proposed to enhance research collaboration, AI tools utilisation, and research outputs among polytechnic lecturers in Kwara State:
2. The polytechnic management should create enabling frameworks that encourage both intra and inter-institutional collaboration. This can be achieved by establishing research clusters, joint project platforms, and Memoranda of Understanding (MoU) with local and international institutions.

3. Regular workshops, training sessions, and certification program memes on the use of AI-powered research tools should be organised by polytechnic management. Such program memes should emphasise practical applications in data analysis, literature synthesis, visualisation, and grant writing to enhance digital proficiency among the lecturers.
4. The polytechnic management should review lecturers' workloads to allow sufficient time for research engagement. Incorporating a certain number research outputs into promotion and appraisal criteria could further encourage productivity.
5. The polytechnic management should invest in digital infrastructure such as stable internet connectivity, high-speed broadband, and institutional access to AI-supported research databases and software to facilitate effective research collaboration and online scholarly engagement.
6. The lecturers should be supported through mentorship, technical guidance, and editorial workshops to publish in high-impact, indexed journals such as Scopus, ERIC, or AJOL. Polytechnic management can also make use of research publication unit to promote staff visibility on platforms like Google Scholar and Research Gate.

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